Clinical assessment of optic nerve disorders

Riordan-Eva P. Eye (2004) 18, 1161–1168

The Optic Neuritis Treatment Trial highlighted the seemingly different results obtained with computerised static perimetry, although this may simply reflect differences in interpretation.[22] Diffuse loss on Humphrey 30-2 is probably equivalent to a central scotoma on Goldmann perimetry. Similarly, on computerised perimetry eccentric fixation may influence the pattern of visual field defect. It is necessary for clinicians to gain experience for each visual field testing technique, as well as bearing in mind that visual field defects are not pathognomonic.
For monitoring optic neuropathy, computerised perimetry is the best available technique, providing sensitivity, reproducibility, and concentrating on the central visual field. It also provides correlation to retinal ganglion cell loss.[23,24]

Understanding Visual Fields, Part I; Goldmann Perimetry

Dersu I et al. Journal of Ophthalmic Medical Technology (2006) 2; 2.

Advantages and Disadvantages

During Goldmann perimetry, dimmer stimuli are used for testing the very center of vision with the intensity increasing as more peripheral portions of the field are tested.
Some patients might prefer it because there is human interaction. By the same token, it is very much examiner dependent[1]. It may not be reproducible by another examiner, and it does not have the advantages of a computerized system for storage and comparison to normative data. Additionally, kinetic perimetry may not be as sensitive as static perimetry in detecting early glaucoma defects[3]. However, Goldmann visual fields might reveal scotomas that were missed between the testing points in static perimetry[4]. The shape of the defects may also be more impressive in Goldmann perimetry1. With severe vision loss (vision worse than 20/200), test-retest variability might be better in comparison to automated static testing. In addition, it shows functional (non-organic) defects on visual field testing better than automated testing.

Comparison between Semiautomated Kinetic Perimetry and Conventional Goldmann Manual Kinetic Perimetry in Advanced Visual Field Loss

Nowomiejska K et al. Ophthalmology Vol 112, Issue 8, August 2005, Pages 1343-1354

However, there are many disadvantages of the Goldmann instrument used for these purposes. Direction and speed of stimulus movement are guided by the examiners' hand and, therefore, are difficult to standardize. Thus, the results depend on the examiner's skills and may be confounded by examiner bias.[9] Examiner dependence can be associated with inaccuracy, which results in a limited capacity to detect defects and poor reproducibility of results.[10] Kinetic VF results, as being subjectively obtained, are notoriously difficult to quantify, and this is made even more difficult by the lack of standardization of equipment and method.[11] Because of the pantograph mechanism in the Goldmann instrument, the spatial resolution decreases with increasing eccentricity, which can give rise to a poor cartographic accuracy.[12] There are also other shortcomings of the Goldmann perimeter, such as lack of autocalibration, lack of permanent documentation of the test procedure

used to determine individual VF borders, and the inability to examine the area of 2° around the fixation point with the standard setting due to the telescope used for fixation control. In principle, this problem can be solved by an alternate fixation target, but it is still a difficult process.
To overcome disadvantages of Goldmann perimetry, a new software-based technique (Invest Ophthalmol Vis Sci 41:295, 2000) called semiautomated kinetic perimetry (SKP) was designed…

Visual field assessment in glaucoma: Comparative evaluation of manual Kinetic Goldmann Perimetry and Automated Static Perimetry

HC Agarwal et al. Indian Journal of Ophthalmology (2000). 48:4;301-6.

Visual field assessment is mandatory for the diagnosis and management of primary open-angle glaucoma. The Goldmann perimeter is widely available, economical and easy to maintain. But it requires frequent calibrations and highly skilled technicians to do the visual field examination; also, it does not measure the depth of a scotoma. It gives a rapid, comprehensive coverage of the entire field and produces recognizable isopter patterns.[1] At the same time, it fails to detect the early diffuse loss of retinal sensitivity. It works well for the definition of the topography of the visual field defects and subsequent progression, but is less efficient in the detection of small field defects.

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In our study, the automated perimeter picked up visual field defects in a larger number of eyes than the Goldmann perimeter. The difference was greatest for eyes with early cupping, which narrowed down progressively with increasing cup-disc ratio.

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HVF analyzer picked up progression in twice as many eyes as compared to the Goldmann perimeter during a follow up of 9 months. The superiority of HVF analyzer has clinical significance, because in a disease with largely irrecoverable visual field loss like glaucoma, it is important to pick up progression of visual field defects early so that the treatment may be modified or altered to prevent further visual field loss. The advantage of the HVF analyzer also lies in its ability to make use of quantified parameters like mean deviation and corrected pattern standard deviation to detect subtle worsening of visual field defect, with statistical level of confidence. This is beyond the detection capacity of the Goldmann perimeter. We conclude that automated HVF analyzer is superior to the Goldmann perimeter in detecting early glaucomatous visual field defects.[15]